ICI magazine

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Opposite: some front-runners. Paint (background), in which ICI's 'Dulux' is a market leader. Left to right: 'Crimplene' yarn, from ICI Fibres, shown in this Lanvin, Paris, dress; titanium, the specialised metal made by Mond Division, fabricated by IMI; Plastics Division's 'Propathene,' of which these chairs are made; cylinders of 'Arcton,' the refrigerant and aerosol propellent, made by Mond Division; tablets of 'Inderal,' a drug discovered and developed by Pharmaceuticals Division, which is used in the treatment of certain heart disorders. See 'My Twenty Years with ICI' by Sir Paul Chambers on page 36.
Photographs of paint and titanium, Seymour Magnum

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Sir Paul Chambers

my twenty years with ICI

As this article appears I shall have completed over twenty years as a full-time executive director of ICI, of which over eight years will have been as Chairman and seven-and-a-half as a Deputy Chairman. It is a time, therefore, when I can look back on what has happened and give some thought to what may happen to the Company in the future.

In 1947 there was a Chairman, four Deputy Chairmen and a total number of directors of twenty or twenty-one, the same as we have today. Of that original Board I am the sole survivor as a director of the Company.

The Company's business is today very different from what it was twenty years ago, both in size and in character. The first balance sheet I examined after joining the Company as Finance Director was, of course, the one for the previous year – 1946 – and this showed net assets of the Group (after deducting short-term liabilities) of £111 million; twenty years later, the balance sheet for 1966 shows net assets of over £1,200 million – eleven times that of 1946. Even if we make some allowance for the change in the value of money, we can see that the Group's business is many times the size it was in 1946. The profits for 1946, after depreciation but before tax and loan interest, were about £15 million; in 1966 they were £98 million, having been £110 million or over for the two previous years. In 1966 we earned no less than £14 million as royalties in respect of patent rights, know-how, etc. – nearly as much as the profits of the Group in 1946.

The sales of the Group as a whole in 1946 were £116 million, and this moved up to the figure of £885 million in 1966. Sales (home external and export) by ICI Divisions and UK subsidiaries have risen from £95 million to £613 million over the twenty years, while the number of employees in the UK has risen from about 93,000 to 125,000. The output per ICI employee in this country, therefore, has risen from about £1000 a year to a figure approaching £5000 a year. The Group figures are, of course, only rough approximations of the true state of affairs because the Company has substantial interests in companies, particularly overseas, where we own 50 per cent or less of the total assets and therefore the figures for these assets and the numbers employed are excluded from Group figures. To take these partly-owned companies into account we would have to bring in a proportion of the total assets and employees of African Explosives and Chemical Industries Ltd., Fiber Industries Inc. of the USA, and other associated companies at home and overseas.

The geographical spread of our manufacturing and selling has also undergone great changes. In 1946 we had no substantial manufacturing operations in the United States of America or on the Continent of Europe. Today these manufacturing activities are expanding, as are our total sales in these countries and throughout the rest of the world. Indeed, in 1967 we have passed an important milestone: more than half the total sales are now outside Britain, so that our fortunes depend less upon the economic conditions of one country – the United Kingdom – than ever, and we hope that this will make for greater stability in the years to come.

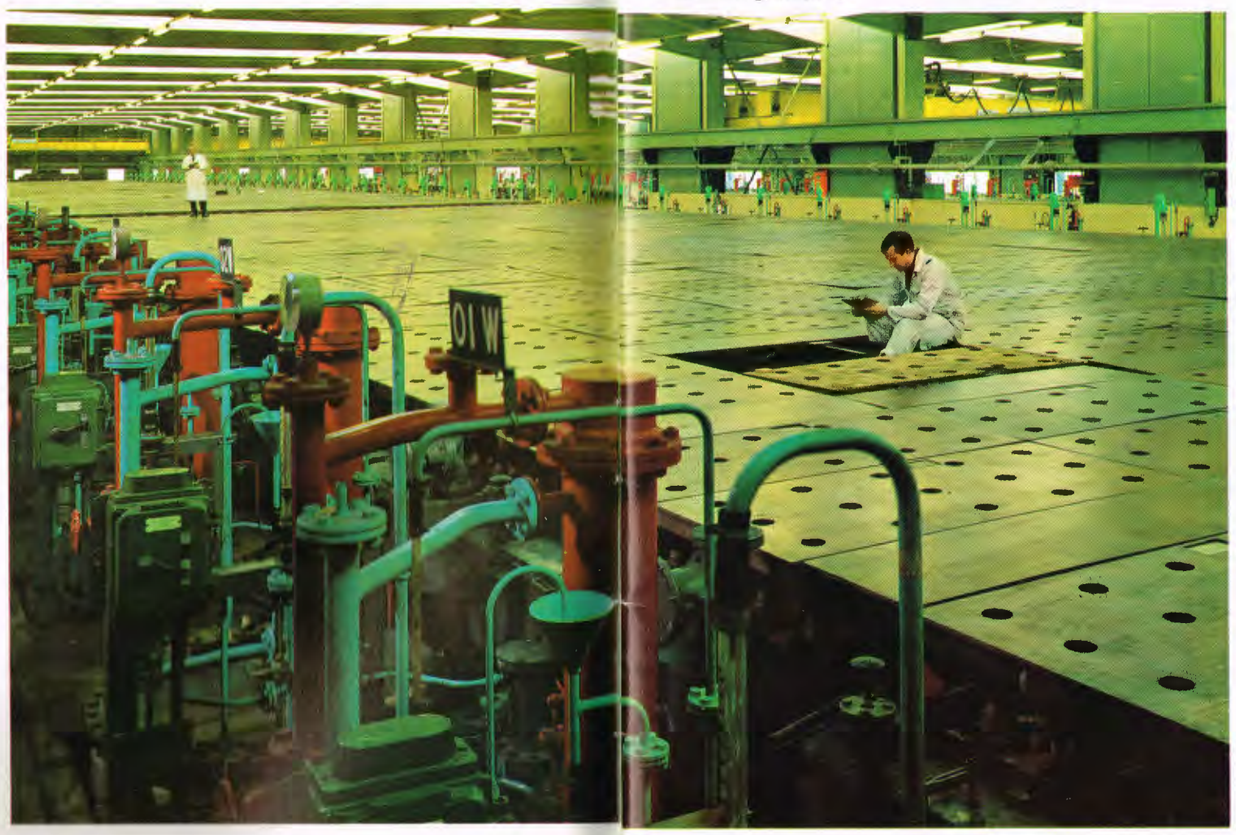
Adequate figures comparing our home and overseas operations continent by continent do not go back as far as 1947, but even for the past ten years the changes are very significant, as the map overleaf reveals. It is not only, however, in the Company's size and in the location of its manufacturing and

DYESTUFFS: 'Procion' dyes, discovered and developed by Dyestuffs Division and first marketed in 1956, were a major breakthrough because they combine chemically with fibres, giving better results. Today there are 70 dyes in the range

FERTILIZER: A silo at Billingham, where Agricultural Division makes over a million tons of fertilizer every year, of which one-half was exported in 1967. Photograph: Seymour Magnum

CHLORINE: Inside the chlorine/caustic soda mercury cell room at Mond Division. The plant, largest of its kind in the world, has a capacity of 200,000 tons of chlorine a year

ETHYLENE FOR EUROPE: Unloading liquid ethylene produced at Wilton Works for ICI's 'Alkathene' plant at Rozenburg, Holland



Trends in Trade: 1956-1966

UNITED KINGDOM

		1956	1966
Assets	£m	375·3	866·2
Employees		116,429	124,601
Exports	£m	73·1	156·2

NORTH AMERICA

		1956	1966
Assets	£m	45·2	88·8
Employees		8,704	11,378
Imports from ICI (UK)	£m	7·7	13·1

CENTRAL & SOUTH AMERICA

		1956	1966
Assets	£m	4·5	20·9
Employees		3,352	3,246
Imports from ICI (UK)	£m	8·6	10·8

EUROPE

		1956	1966
Assets	£m	6·6	64·7
Employees		3,490	7,532
Imports from ICI (UK)	£m	18·9	72·4

AFRICA

		1956	1966
Assets	£m	12·4	27·6
Employees		1,733	1,164
Imports from ICI (UK)	£m	11·2	18·1

ASIA

		1956	1966
Assets	£m	11·3	29·5
Employees		6,082	9,655
Imports from ICI (UK)	£m	21·2	27·6

AUSTRALASIA

		1956	1966
Assets	£m	24·1	110·0
Employees		8,146	14,130
Imports from ICI (UK)	£m	5·5	14·2

REITZ

GERMANY (near right): ICI (Europa) Fibres GmbH make nylon and Terylene fibres at their Oestringen Works near Heidelberg, opened in 1966

AUSTRALIA (top right): Fibremakers Ltd.'s plant at Bayswater, near Melbourne, produces nylon and Terylene. Fibremakers now meet most of Australia's demand for nylon

INDIA (centre right): 'Gramoxone,' Plant Protection Ltd.'s non-residual weedkiller which acts only on green plant matter, is helping to revolutionise farming methods. In this Assam tea plantation spraying with 'Gramoxone' contrasts with traditional slashing. 10 days after, slashed weeds have completely recovered

USA (bottom right): This 'Alloprene' chlorinated rubber plant of ICI America Inc. at Bayonne, New Jersey, serves growing American demand for this Mond Division product, used mainly in paints, printing inks and adhesives

HOLLAND (below): ICI (Europa) Ltd. make 'Alkathene,' 'Perspex,' 'Transpex,' 'Diakon,' Terylene polymer, 'Melinex' film and nylon polymer with material shipped from Britain on this 450-acre site at Rozenburg. Between 1960 and 1966, sales of ICI products made in Europe rose to 20 per cent of all European sales

selling operations that there has been something like a revolution. The pattern of what we produce is very different. Some basic products which were important twenty years ago are still important today. These include soda ash, caustic soda, chlorine, explosives and dyestuffs. On the other hand, of total sales today the greater part is of products either non-existent or relatively unimportant twenty years ago. In 1946 polythene and nylon constituted only a small part of total sales, and Terylene and 'Fluothane' none at all.

The change in the relative importance of some of our major products can be more easily realised by a glance at the figures, going back over forty years:

ICI manufactures 1927–1966: the changing pattern
Home and overseas sales by Divisions, expressed as a percentage of total Company sales in each year

Divisions	1927 %	1949 %	1966 %
Agricultural Fertilizers and industrial products (1949 includes building and some petrol products)	5·7	19·0	12·6
Dyestuffs Dyes, rubber chemicals, etc. (1966 includes nylon salt)	8·0	19·3	11·2
Paints Paints and leathercloth	4·7	8·0	7·6
Mond Mainly heavy inorganic chemicals (e.g. soda ash, caustic soda, chlorine, salt, lime)	61·8	34·2	21·2
Nobel Explosives	19·8	8·8	3·0
Nobel Other chemicals		1·8	1·8
Pharmaceuticals		2·3	3·0
Plastics Polythene, PVC, 'Perspex,' 'Fluon', etc.		6·6	13·1
Heavy Organic Chemicals Oil-refining derivates such as ethylene, propylene, vinyl acetate			8·0
Fibres Nylon, Terylene, etc.			18·5
	100·0	100·0	100·0

Other, less tangible, changes are almost as important as those revealed by the figures, most important of all perhaps being the change in attitude towards production and marketing.

Twenty years ago, the marketing of many products was still dominated, or at least influenced, by regulatory systems or cartels which had their origins in the inter-war years when there was so much over-capacity and unemployment. Nowadays there is little regulation or cartelisation left. Throughout the world there is pretty fierce competition in major chemical products, including plastics and fibres, and life in world markets is altogether more difficult than it was then. The Company's representatives have to fight for sales and fight for profits in a way almost unknown twenty years ago. Although the competition is much harder, it stimulates us to greater efforts to increase efficiency, to develop new and improved products and processes, and to use our resources of manpower and capital more effectively.

One result of this drive to improve our competitive position in world markets is that we have been forced to consider how to reduce costs by erecting larger plants, the size of some of our major new plants today being undreamed of twenty years ago. Just as one example, an ammonia plant based on coke oven gas might have had a capacity of 50,000 tons a year; the three new ammonia plants (shown on the front cover) which have just come on stream at Billingham have each a capacity of 300,000 tons a year, and the cost per ton

Above: The 2,000-acre Wilton Works employs over 13,000 people in over 20 different plants and represents an investment soon to reach £300m. Here is the world's largest single-stream naphtha cracker, which will have a capacity of 450,000 tons a year

of ammonia is much less than it was in those early days, in spite of increases in wages and salaries. Even by comparison with the relatively new plants that these latest ammonia plants replaced, manpower costs per ton of product have fallen from 11·6 man-hours to 0·3 man-hours, and the power consumption has fallen from 1800 kilowatt hours to 300. This is just one example of the technological revolution which is leading us into an era in which larger and more complicated plants will be controlled by computers.

There has thus been something like a revolution in the marketing outlook and another revolution in our technology. The net result is that for some products we are now concerned with markets much larger than Britain – and we have become much more international. Our know-how is sold or used in production all over the world in just the same way as our products, and our profits would be poor if we concentrated our attention upon the markets in Britain alone.

Although the profit in 1966 at £98 million may seem large in relation to the profit of twenty years ago, it is not large enough in relation to the total capital employed, and our targets must be set at substantially higher levels for the future.

With our large new plants coming into operation, our improved marketing throughout the world, in particular Continental Europe, we shall not be satisfied with profits at the 1966 level. Indeed, we ought to have substantially higher profits even if our capital resources remain unchanged.

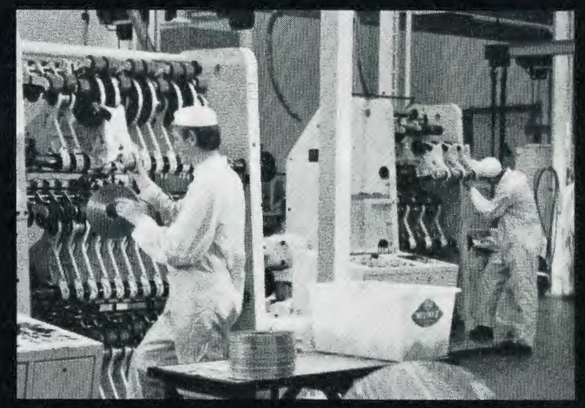
But the amount of capital, the spread of products, and the most important area of marketing will all continue to change. The Board will continue to grapple with the problems of what new fields to enter, which existing activities to abandon, if we are to remain in the forefront of the world's chemical industry and to improve the Company's profitability.

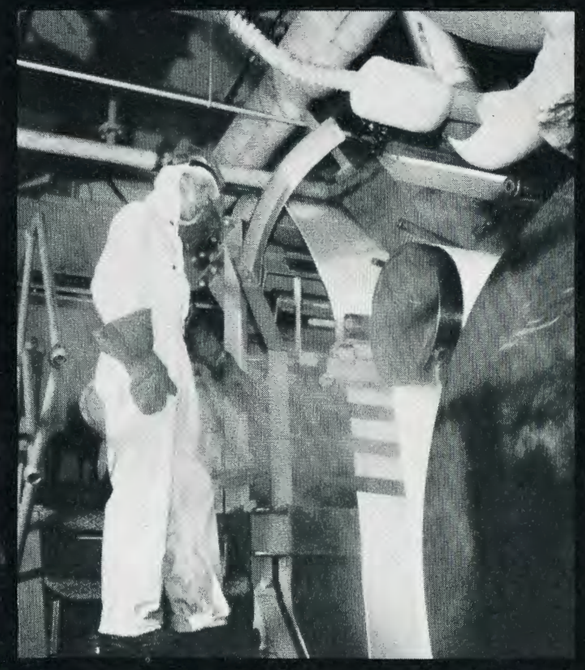
It is always easy to find theoretical answers to the problems which face the Board. Practical answers which are capable of achievement are quite another matter; but all members of the Board are very alive to the problems and I am sure they will come up with sound practical answers.

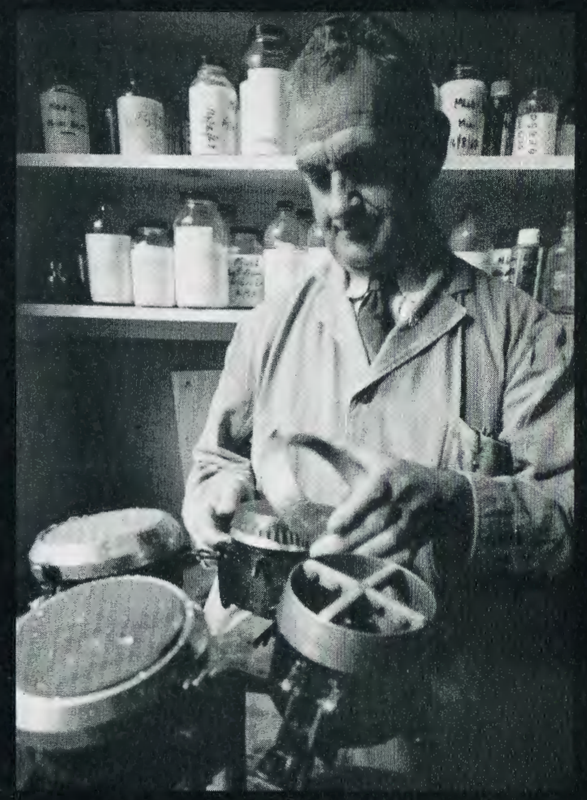
A further change has been the increasing devolution of responsibility to chairmen of Divisions, chairmen of overseas companies, and indeed all down the line. The object of this change, which has not always been achieved, is to get decisions made by those who, by their experience and knowledge are best able to make them. Better communication of the Board's policies and better internal and external relations all help to improve efficiency and, what is almost as important, to make the job we do more interesting and, I hope, more rewarding in every sense.

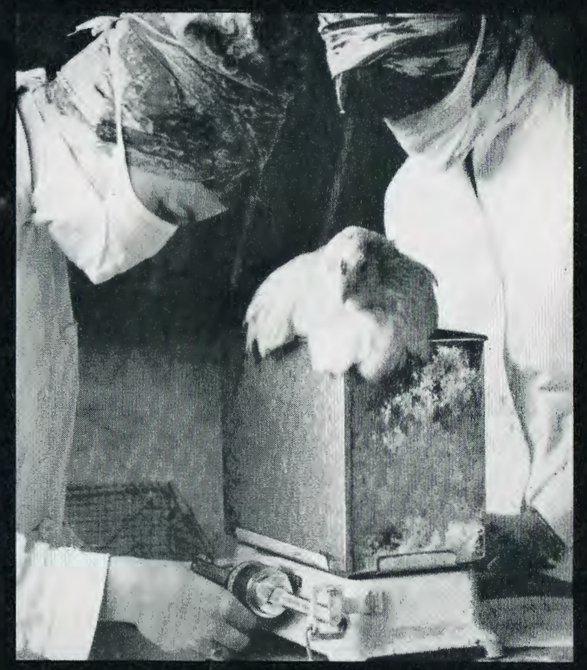
My whole service with the Company has been as a member of the Board, and I have found it most enjoyable. From the beginning, when I joined as a complete outsider, having only a slight acquaintance with three directors, I have had nothing but kindness and warm friendship from my colleagues.

The ICI Board has always had directors with strong personalities who could and did express differing views very forcefully. This is as it should be, but when a decision is reached there has been a firm closing of the ranks and a loyalty to the Board's decision. One of the Chairman's main duties is to ensure that a clear decision is reached on every issue, however strongly held the differing views of directors, and this requires hard though rather intangible work. If it has been hard, it has always been enjoyable, and I believe that, with our policy of further delegation of responsibility, ICI will continue to be a place in which there will be many jobs to do where the work is hard but always rewarding.









Top left: An operator in the Textile Development Dept. of ICI Fibres Ltd. at work on a warp-knitting machine
Right: Testing silicone-treated fabric for water repellency at [illegible]bel Division
Left: The slitting section of the 'Melinex' film plant at Rozenburg
Below, left: Casting nylon polymer in a continuous ribbon at a Dyestuffs Division works on Tees-side
Below: Weighing a chicken during weight gain trials in Pharmaceuticals Division's Biological Research Dept.

it's ICI - in any language

Lawrence Hogben

Nearly twenty years ago, as a new boy in ICI, I remember persuading my equally new secretary to type a letter in Spanish to a Spaniard whose help I needed. I was quickly told by the senior lady supervising my secretary that *all* ICI letters should always be written in English and it was for others to understand us. Times, and this ruling, if it ever existed, have changed. But there are still communication problems in an ICI that grows more and more international. An unforecast but useful feature of business communications in Europe is the fact that since the war, and particularly over the last ten years, English has become overwhelmingly dominant. Although not one of the official Common Market languages, it seems to be the most important even to those who speak several of the EEC languages. In EFTA you can hear Finns talking to Swedes in English, although Swedish is a minority language in Finland, while before the war German would certainly have been their most likely common language. I have heard gatherings of Swiss, Germans and Austrians holding meetings in English – although in this case perhaps linguistic vanity as well as efficiency may have been a motive.

In ICI companies in Europe the language problems are many and various, and the solutions equally diverse. In Switzerland, with its three main languages plus more dialects, there are language practices which are generally accepted, and these can easily be adopted by any company. But in Belgium, which has only two languages, Flemish and French, but where language-consciousness has greatly increased recently, the problem is just as difficult and not so well regularised. For example, the name I.C.I. (Belgium) itself represents a compromise between the French I.C.I. (Belgique) and the Flemish I.C.I. (Belgie) which were the relevant alternatives. Many other Belgian companies have rather formidable and lengthy signs outside their premises simply because they feel bound to show both versions of their name. The Belgian problem of putting everything on a letterheading in two languages is a difficult if not insoluble one – and has only been overcome in ICI by having two different writing papers. One of our Belgian customers solved his packaging problems by labelling all his goods (which were sold only in Belgium) in one language – English – and claimed that his customers all liked it. We would prefer, of course, to put ICI in the name of each company – the full stops are a rather messy complication which have never been included on our roundel. But ICI is the French word for 'here', and so to prevent confusion the names of the Belgian and French ICI companies have the stops between the letters of I.C.I., for the time being at least, while most other countries do without. You can work out for yourself why our Danish selling company has been called I.C.I. (Danmark) A/S and why it is being changed to ICI Danmark A/S. Only in Italy do we suffer from the Smith syndrome – there are six other ICIs in the Milan telephone directory.

ICI is the name, then, of most of our selling companies and the name we are using everywhere in Europe. If you wonder whether more people still recognise us as Imperial Chemical Industries than as ICI, the fact is that a recent poll shows the scores to be about equal, but the use of ICI is moving up.

How are these letters pronounced in all the different countries? Although it would be hard to imagine us pronouncing German initials in German, the Germans say ICI as we do in English, and I have been corrected by Germans for saying *ee-tsay-ee*. The French more predictably use the French initials *ee-say-ee*, while the Spaniards delight in saying it as one word *eethee* or *eesee*, depending on whether they have a Castilian lisp or not. Someone who meets and has to understand all the possible variations is Mrs. Roegier, head receptionist and telephone operator of ICI (Europa) in Brussels. She speaks and uses English, French, German, Dutch and Italian, but her most-used language remains English, which is what, after all, one would expect in a British company.

In an ICI office there must, of course, be an internal *lingua franca* for talking to colleagues, and this is generally the local language. But as soon as the communication crosses national boundaries, it goes almost invariably into English. This means, for example, that publicity material can originate, say, in French in France, its words be translated into English and the whole thing be sent to ICI (Europa) Fibres at Frankfurt, whence, if it is thought suitable, it is sent out, still in English, for translation into the various languages of the Common Market for local use.

Of course, if care is not taken words lose their biting edge through double translation. But this just emphasises the importance of translation. Not only do technical words have to be right and in current usage, but the original thrust and commercial drive must be reflected in other versions. This can mean, when outside people will be reading what you want to say, that more latitude than usual must be given to the translators, frequently members of ICI staff, but that any technical terms must be checked by a technical man. Quite a natural error, for example, was the translation of the English 'ICI Cargoes on the Rhine' into the French for 'ICI Cargo Ships on the Rhine,' because the French word *cargo* means a cargo ship. When time permits, therefore, the final foreign-language version of an English text is checked by a native speaker – and one who still lives in his country (absentees tend to fail to keep up to date with new usages). But in ICI (Europa) the secretaries have an average of 2·3 languages each and use in their work an average of 1·6 each. So English is not the only language used there.

When 80 European journalists toured ICI plants in England, Holland and Germany last autumn a decision had to be made about the languages to be used for talks and the written materials supplied. French and German were selected as the spoken languages, and all our guests had to know one of these quite well except the Scandinavians, who were put into English groups. But to make their task easier we translated the press releases and other documents into five languages. The result, our visitors assured me, was admirable from their point of view. Because of the efforts made by Divisions to provide French- and German-speaking guides from their own staffs, our guests soon formed the impression that virtually everyone in ICI in England spoke one or other of these languages – and hence that we were better in that respect than some of our European competitors whose press tours were monolingual. And there was one quite unlooked-for side-effect. Some French women journalists on the tour said they were surprised to find just how pleasant, well-mannered, interesting and humorous the English male was, now that they had at last succeeded in talking to him in French. 'We think you are not 'alf as 'orrible as they say,' said one of them flatteringly. Yet another reason perhaps why we should all make for our language classes. . . .

France tames the tides

Philip Goodall

Ever since reading about the Rance tidal barrage which the French have built across the estuary of the River Rance in Brittany between St. Malo and Dinard, I had been interested in it as an imaginative project – the first major scheme for the generation of electricity from tidal power and an outstanding civil engineering work. In these waters the average rise and fall of the tides is 36 feet, reaching 44 feet with spring tides.

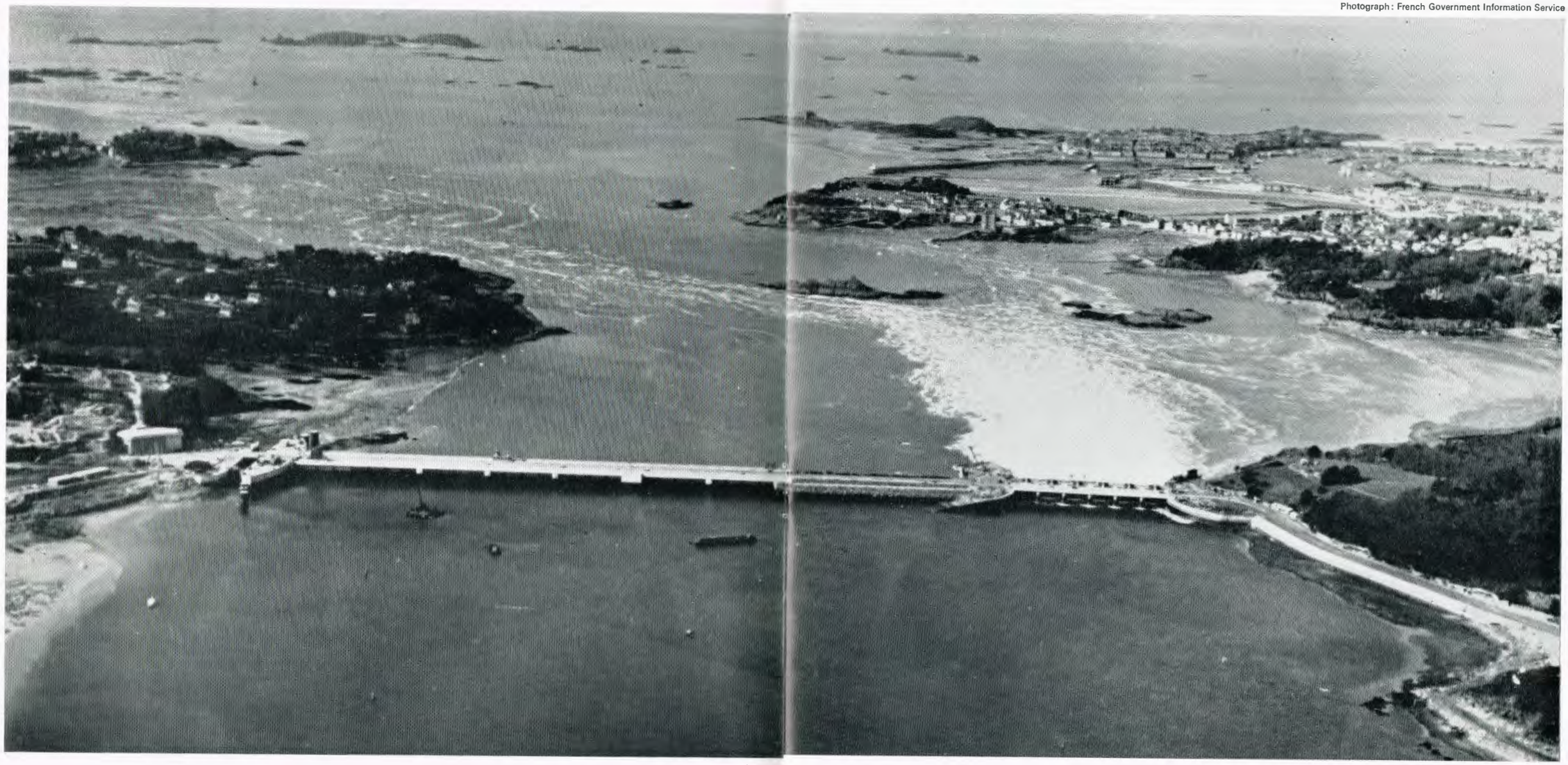
Last year I had an unexpected opportunity to see the barrage, and I took it. My wife and I had planned to spend our holiday caravanning in Normandy and in Southern Brittany during the month of June. After a few days on the Normandy coast, we struck south-west for Brittany. By this time I had already talked my wife into visiting the barrage, so I chose a route taking in St. Malo and its neighbour St. Servan on the eastern shore of the Rance, where we hoped to find directions to the barrage. But no such luck! With our caravan we were quite defeated by the narrow, winding streets and by a shortage of signposts, so we gave up the whole idea.

Chance then played a part, because our stay in southern Brittany was marred by indifferent weather and we decided to return to the north coast. While selecting a camp site from the Michelin camping guide we found a likely camp – back at St. Servan. On arrival we found that not only was the site very good, but it gave an excellent view of the barrage. The coincidence was too strong to ignore, so we decided to try again.

When we did, we soon found out why it was so hard to find the 'Usine Marémotrice,' as it was known locally, from our side of the river. Always so logical, the French had carried logic to extremes over the access to the barrage. Because the approach road began from the Dinard side, on the west, any information the public might want was made available only at Dinard, with nothing at St. Malo. This was courteously explained to us by the head of the *Syndicat d'Initiative* (Tourist Office) at St. Servan. While flattering to his English enquirers, his voluble French left many gaps in what was clearly a fascinating story. He also explained that the only close approach to the site in general was through Dinard too – at least until the official opening of the road, which was to take place while we were still in the area. This was why we could not get at the barrage on our earlier visit.

The barrage had been opened for electricity generation by President de Gaulle in 1966, but the road across was not officially opened until July 1, 1967. This was not quite such an historic occasion, since the President did not come and the ceremony was carried out by the Minister of Works. It also

Photograph: French Government Information Service



France tames the tides

had to compete on the same day with the inauguration of a new swimming pool at Dinard, the opening of a new casino which featured the personal appearance of Nana Mouskouri and, above all, the arrival in St. Malo of the Tour de France cycle race, top event in the French sporting year.

An estuarial barrage is a dam which controls the flow of a river and harnesses the power of the tides to make electricity, and the building of barrages for this purpose has been discussed in Britain for many years. A comprehensive scheme for a Severn barrage was proposed in 1948, while the recent controversy about Manchester Corporation's right to draw water supplies from Ullswater in the Lake District brought a counter-proposal for a barrage across Morecambe Bay. Similar schemes for the Solway Firth and for the Humber have also been put forward.

The French, however, were not content just to talk: they went ahead and built their tidal barrage across the estuary of the Rance, where the tides are compressed into a channel 800 yards across. In principle, this barrage is a dam housing three kinds of equipment: sluice gates, to control the main flow of water; reversible hydraulic turbines which drive electric generators; and a lock allowing ships to pass between estuary and river. The twenty-four 10,000 kw turbines (known as 'bulb' turbines) are quite new in design and were specially developed for this scheme. Everything except the turbine runner (the actual 'wheel') works inside a pressure-tight housing and is hence always accessible for maintenance.

Operating technique, at its simplest, is just to pen the sluices at low water and let the basin upstream of the dam fill up with the rising tide. At high water the sluice gates are closed, and as the tide falls, so the water – a million gallons a second – passes through the turbines and generates electricity. In practice, a more complicated system is used – or several systems, depending on the demand for electricity and the state of the tides. Since the turbines were also designed to work in reverse, they can also generate electricity while the basin is being filled by the incoming tide. They can also be used as pumps – driven by off-peak electricity – to fill the basin *above* the high-water mark, so that more electricity is produced at peak demand periods while the tide recedes and the basin empties itself through the turbines.

Keener than ever by now, I asked the tourist office in Dinard about visiting arrangements. Very soon, equipped with an excellent brochure (in English), we found ourselves on a conducted tour. It says much for our guide's stamina that he conducted up to six parties every day. His explanation of the intricate cycle of operations was masterly, although the finer points were probably lost on the largely French audience with only a smattering of technical knowledge – just as they were on the much smaller English one with some technical knowledge but only a smattering of French!

The tour gave excellent views of the access road, the locks and the control tower, but the turbines themselves we could not see. In place of the usual power station turbine hall with rows of turbines, there was an impressive chamber over 1,000 feet long which gave access to the 24 turbines 40 feet below. The guide's fluent exposition had to compete (as so often in civil engineering works) with a compressor and a pneumatic drill. Yet another distraction was a French father who was calmly looking down into the deep machinery well. The handrail around the well gave him excellent protection, but he had obviously forgotten about the five-year-old child perched high on his shoulders!

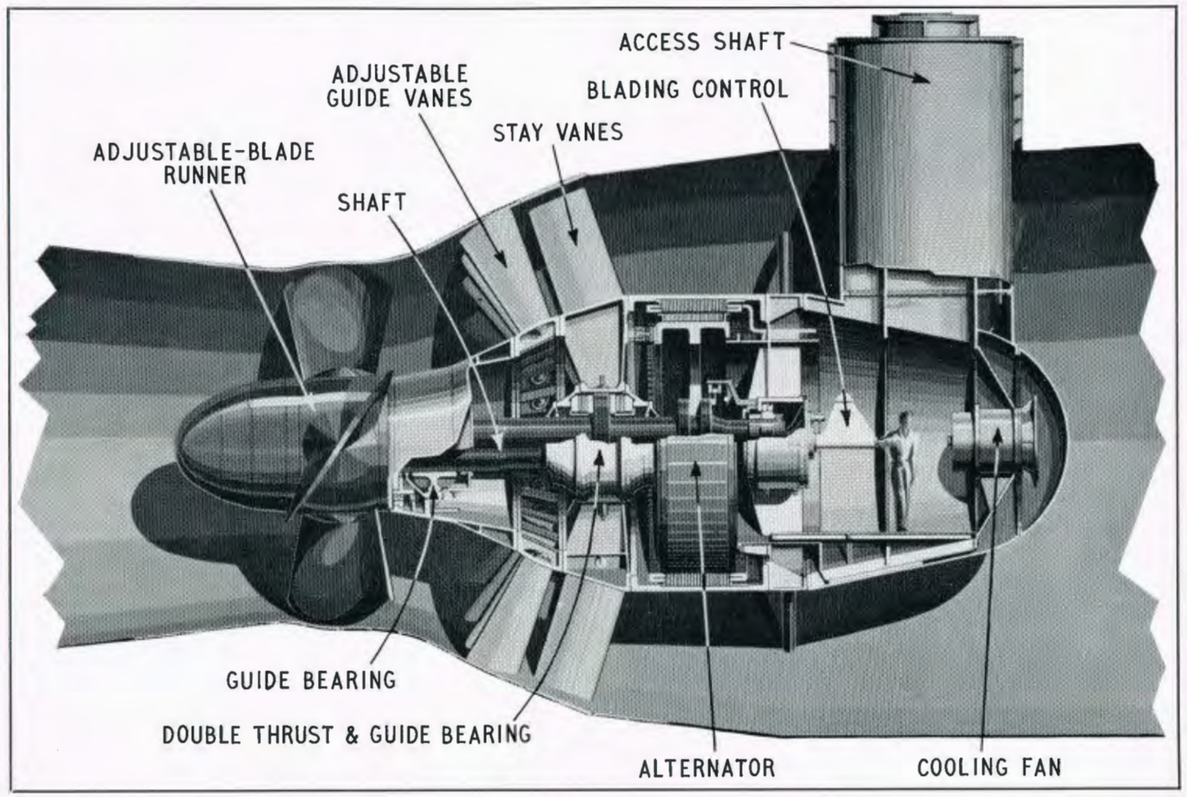
Some French technical experts think the Rance scheme may be the first – and the last – hydro-electric plant of its kind operating from a tidal barrage, because the operating costs will soon exceed those of nuclear power stations. Disappointing though this assessment may be (and it may not affect the multi-purpose schemes suggested for British estuaries), the French seemed pleased enough with the results of their barrage. Even if they never build another, they have three achievements to their credit: a new design of water turbine which should be of great use for conventional hydro-electric schemes on other rivers; an excellent roadway on top of the dam which cuts 22 miles from the distance between St. Malo and Dinard – and not least, the prestige of having planned and carried through an imaginative piece of civil engineering.

If the economics had been right, the French were prepared to extend the barrage principle much further. They had looked at a bigger project for a barrage 21 miles across, linking the Iles de Chaussey with the coasts of Brittany and Normandy – and were even prepared to consider one that included Jersey. But model tests showed that, since tides have an essentially coastal effect, the very act of constructing so large a barrage in these waters would seriously reduce the rise and fall of the tides nearby and so defeat the whole object of the scheme.

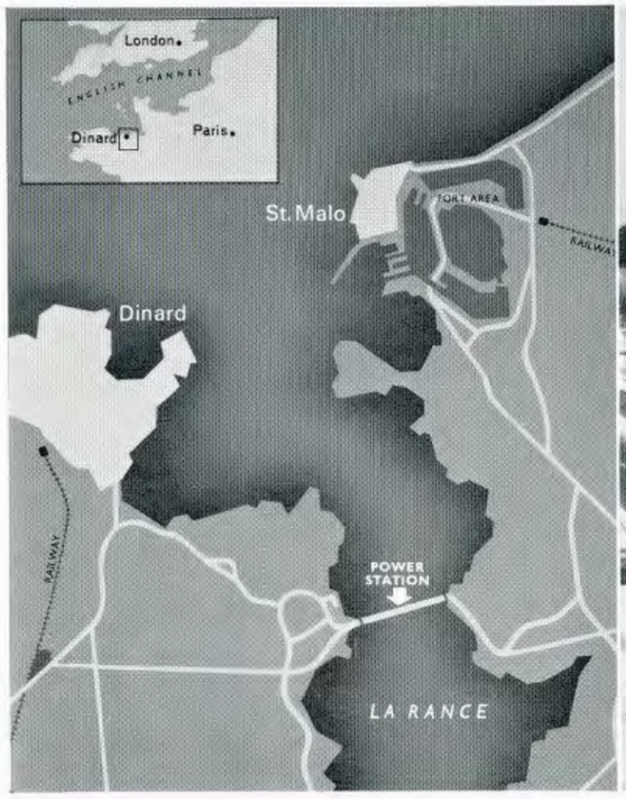
The French, at considerable cost, have shown the way. Where could the next barrage be? Probably either at a site like Morecambe Bay, which would combine hydro-electric power with drinking-water conservation, thus removing the need for further demands on Lakeland water, and also create a major trunk road, or in a region like the Severn estuary with a high rise and fall of tides. In the New World, suggestions include the Bay of Fundy in Newfoundland, where the average rise and fall is 50 feet; Cook Inlet, Alaska (33 feet) and the Gulf of San José in Argentina (45 feet).

Whether one considers the Rance barrage as a pioneer venture giving prestige at enormous cost or as the forerunner of many similar tidal power schemes, one cannot fail to admire the concept, design and execution of this unique project.

This photograph of a model of one of the 24 Rance bulb turbine sets shows how they are suspended in the river below the main structure of the dam and driven by the flow of the tides. Photo: Groupement des Constructeurs de Groupes Maremoteurs de la Rance



The Rance estuary, showing the position of the tidal barrage



This dual carriageway road across the top of the dam has cut the drive between St. Malo and Dinard by twenty-two miles

Sir Paul Chambers

Sir Paul Chambers recently gave up the chairmanship of ICI and retired from the Company he has served for over 20 years, first as a director and later as a deputy chairman and as chairman. Sir Peter Allen, who succeeds him as chairman, writes:

These last twenty years – particularly the last eight while Sir Paul has been in the chair – have been among the most critical in ICI's history. A production-oriented company formed in a protective era of business and reflecting the imperial idea in its very name has been adapting itself to become more consumer-minded, less protected and more international in its interest and operations. Not only have these years brought radical changes in the pattern and scale of production. They have brought other major readjustments, often difficult, but necessary to the growth of the Company and the well-being of its employees alike. As a result, ICI is coming through this period better equipped to hold its own in the modern world and to improve its already high standing in the chemical industry.

In all these achievements Sir Paul Chambers has played a conspicuous part. During his years as chairman the Company has been reorganised to cope with the challenges posed by change. A vast construction programme (over £600m within five years) is well under way, while the Company has made real progress in Europe, its fastest-growing market, both through exports and through local manufacturing.

When Lord McGowan invited him to join the ICI Board in 1947, Mr. Chambers (as he then was) had already achieved success in other fields: with the Inland Revenue and in India where he overhauled the nation's tax system; in 1940 he had returned home to become Director of Statistics and Intelligence at the Inland Revenue and later was Secretary to, and a member of, the Board of Inland Revenue; just before the war ended he became Chief of the Finance Division of the British Element of the Control Commission for Germany.

When Sir Paul joined the Board, with this varied background in finance and taxation he was a new phenomenon and he quickly made his mark. Finding his way with ease through the long, complicated reports that come the way of every ICI director, he always saw both the wood and the trees. Coupled with his ability to get to the heart of a problem and his clarity of thought, is a friendly manner which has been appreciated not only by his Board colleagues but among men and women at all levels in ICI. Few industrial leaders can have been so approachable. Besides being a clear thinker he is also an easy and lucid speaker both in private and in public. His conduct of Annual General Meetings, of Central Council Meetings or of Central Staff Conferences, and also his performance at press conferences where questions often come thick and fast, have often been praised, and deservedly so.

At Board and other meetings of directors too, he has been a good chairman, giving full play to the opinions of others. He has made particularly good use of the knowledge and experience of non-executive directors, realising how important it is that the Company should not become too inward-looking and that advice from these outside members could improve Company awareness of industrial and other trends in the world beyond ICI. Sir Paul has been a strong advocate of Britain's entry in the European Common Market. This is not surprising when one considers how strongly he has helped to promote an increasingly international outlook within ICI. He has seen ICI's overseas business grow until it is now greater than our business in the UK.

In character and outlook the Chairman of ICI has in many ways to be an ambassador-at-large, making contact with people at many levels in the countries where it sells or operates, up to the highest levels of Government. Sir Paul's training and background, together with this quickness of mind and ability to get on with people, have fitted him exceedingly well for this role.

Not least of his assets in promoting the Company's interests has been his astonishing stamina on long, crowded visits. He has regularly visited not only factories and Divisions in the UK but innumerable subsidiary and associated companies overseas. On overseas visits Sir Paul has tried to see not only the ICI people on the spot but other British industrialists, the British Ambassador and ministers of the country, including the Head of State if possible.

For example, on a recent visit to South America, he flew about 18,000 miles and visited four countries in 20 days – Argentina, Brazil, Chile and Peru. Accompanied by the chief executive of the local ICI organisations, he visited seven ICI offices and five plants, attended one board meeting, presented awards 'at two long-service functions and was a guest at seven receptions and parties with ICI staff and their wives. He also met British Ambassadors and their staffs, talked with senior ministers, attended seven functions for diplomats, businessmen, and bankers and called on the Presidents of two of the countries.

In accepting his resignation, the Board formally recorded their warmest thanks for Sir Paul's outstanding service and 'for his wise leadership in the eight years of his Chairmanship, during which the most harmonious relationships have existed on the Board.' He will be a hard man to follow.

We know that Sir Paul is retiring to have more time to spend with his young family and to relax a little after so many years of arduous work and we wish him a speedy recovery from his operation. None of his colleagues and other friends can believe that his energies will not find other outlets in the future. In whatever he does we wish him, and his family, well.

SIR PETER TAKES OVER

As we go to press Sir Peter Allen becomes Chairman of the Company. He took over on March 1, Sir Paul Chambers leaving a month earlier than was expected in order to enter hospital for an operation. His appreciation of Sir Paul was written before this took place.

A chemist whose whole working life has been deeply involved with ICI, both in Britain and in the key North American market, Sir Peter held senior posts in the old Alkali Division and later in Plastics Division, of which he became Chairman in 1948. Becoming an ICI Director in 1951, he was President of Canadian Industries Ltd. from 1959 until 1962. Soon after returning to the UK from Canada he became an ICI Deputy Chairman. As a member of the British National Export Council and chairman of its committee for exports to Canada, Sir Peter has been particularly concerned with the promotion of British exports, for his services to which cause he was knighted in June 1967. He is well known throughout the Company for his special studies of productivity.

Everyone in ICI at home and abroad will wish him all success.

Lord Beeching

Lord Beeching will be resigning from the Board on March 31 so that he can devote more time to other activities. The Board have accepted his resignation with great regret, and have expressed the hope that at a later stage the nature of his duties would allow him to rejoin the Board as a non-executive director. Mr. Michael Clapham, soon to be an ICI Deputy Chairman, writes:

Dick Beeching's service with ICI began just over 20 years ago when Sir Ewart Smith brought him in from Fort Halstead, the home of the Ministry of Supply's Armaments Design Department: a suitable launching pad for one whose career was to be so rocket-like. His background until he joined that forcing-house for talent had been not unlike that of many ICI managers: he was educated at Maidstone Grammar School and Imperial College, London, where he read physics, took first-class honours, and went on to research, a Ph.D., and the publication of a thesis on 'Electron Diffraction.' After two years with the Fuel Research Station he joined the Research Department of the Mond Nickel Company in 1938, and in 1943 was recruited from there for armaments design.

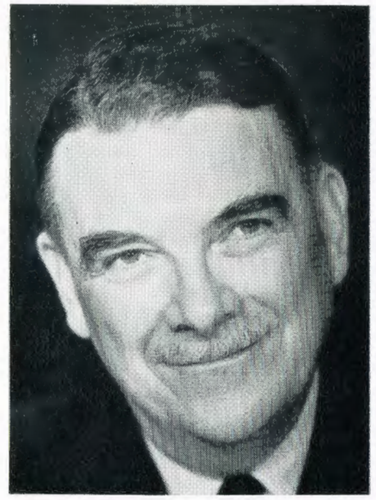
Fort Halstead, under Sir Ewart Smith, was run on the principle of 'promote unmercifully'. Those who could take responsibility got it, and at the age of 34 Beeching was deputy chief engineer. In 1948 he was recruited to the Technical Department at Millbank and sent on a series of assignments to Divisions, doing and promoting what nobody then dared to call operational research. In 1951 he was put on the Terylene Council; in 1953 sent out to Canada, to take charge of Terylene development there; and in 1955 brought back to be chairman of what was then the Metals Division.

At the time, many people in ICI found this appointment startling, and in many a Division the board-room sweepstake went to the man who had drawn 'the rest of the field'. In fact, as those of us who worked closely with him there quickly realised, it was an inspired recognition of a talent particularly needed in what was then a traditionalist organisation in a somewhat archaic industry. Dick Beeching quickly displayed his ability to cut through the tangles of established practice and venerable prejudice, to proceed from first principles by rigorous logic to reasonable conclusions (and to make others do the same), to see the essence of complex problems quickly, and to remain cheerfully imperturbable in times of crisis and emotion. His performance as chairman was immensely stimulating to most of us in the Division, if rather alarming to the unadaptable: and it was an excellent training-ground for talents later to be displayed in the far more antiquated organisation of the railways. Nobody was surprised when two years later, in 1957, he was promoted to the ICI Board as technical director.

From then on the Beeching saga is known to most people in this country. After being a member of the six-man special advisory group on the British Transport Commission he was reluctantly released by the Board to go for a few years to a job which he knew would be hard, thankless and frustrating: the reorganisation of British Railways. Of his work there one can say, as of the architect of St. Paul's, that to see his monument we can look around us; though of his major plans, as of Wren's, many are left unrealised, victims of the timidity and waywardness of governments. But this reluctance to swallow the prescription has not deterred the Government from seeking further advice from the prescriber: just over a year after his return to ICI, the 'great and good doctor' – to quote one of his railway colleagues – now Lord Beeching and a deputy chairman of ICI, was asked to become chairman of the Royal Commission on Assizes and Quarter Sessions; yet another formidable task in the public service, to which he intends to devote all his time in the next few months. His many friends in ICI will wish him every success in this and in whatever further enterprises he may undertake; and they will hope too that he will allow himself time to play his golf and return to his painting.

Mr. Harold Smith

Mr. Harold Smith retired from the ICI Board on February 29 after more than 38 years' service with the Company. He became a director in 1961 and since 1964 has been petrochemicals field director and territorial director for the USSR, Eastern Europe and the People's Republic of China. Mr. Peter Menzies, one of ICI's Deputy Chairmen, writes:



It is often claimed by Dyestuffs Division men that they trade more widely across the world, travel more remote corners and meet more diverse people than any others in ICI. Such a claim from Harold Smith would certainly be true.

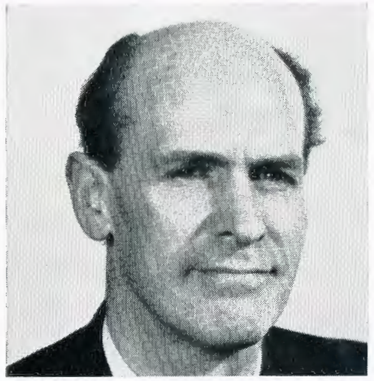
Harold Smith was educated at Westminster City School and at the Royal College of Science, London University, where he took degrees in chemistry (with first-class honours) and in chemical engineering. Chemists with experience of engineering are rare, and Harold Smith was one of the select few who joined ICI in 1929. He began with the British Dyestuffs Corporation Ltd. (now Dyestuffs Division), working on schemes for the development of the dyestuffs industry in this country made possible through the formation of ICI a few years earlier. His early years were occupied in positions of increasing responsibility at Division works at Blackley, Grangemouth and Huddersfield. While in the Division he became involved in a long series of overseas visits. Early visits to India led to many frustrations, but resulted eventually in the establishment of a dyestuffs manufacturing unit at Bulsar in which ICI now has a substantial interest. Later he was engaged in the reorganisation of the Company's dyestuffs manufacturing interests in the United States.

Harold Smith became a joint managing director of Dyestuffs Division in 1955 but transferred shortly afterwards to the then General Chemicals Division, where he was for two years Division chairman, before being appointed to the ICI Board. During his spell as technical managing director of Dyestuffs Division, and subsequently in General Chemicals Division, Harold Smith was at times the despair, but more often the inspiration of those working with him. He had a simple, direct, technical approach to problems, maintaining that the solution was 'just to find the right catalyst and then let it work damn hard!' He was on many occasions right, and when so informed by his astonished colleagues would give his well-known expansive and forgiving grin. He had inevitably to say 'I told you so.'

Soon after joining the ICI Board he became the director responsible for petrochemicals and for developing trade with the USSR, Eastern Europe and other Communist territories, 'including Outer Mongolia'. And it was in his relationships with those in charge of affairs in Communist territories that he made his most notable contribution. The Company's sales to these territories increased from a negligible sum to rather more than £10 million in 1967. But this is only a small part of the benefit to this country from the work he carried out. As a nation we have become much

Mr. M. J. S. Clapham

Mr. A. E. Frost



Mr. S. D. Lyon

Mr. F. J. K. Hillebrandt

Mr. R. W. Pennock

involved in the export to Eastern Europe of equipment for the manufacture of polythene and synthetic fibres. These projects are based on ICI technical knowledge, but without the patience and endeavour he put into the work the various contractors involved would not have been brought together into one homogeneous team. Substantial benefits have already been gained, and the very friendly relationships which have been established with those responsible for industry in these territories will inevitably lead to further satisfactory business for us.

We shall all miss him both as a friendly colleague and for the sound judgment he brought to our discussions of Company affairs. Our best wishes go to him and Mrs. Smith for a long and happy retirement.

Board changes

In a series of ICI Board changes, announced on January 25, Mr. M. J. S. Clapham has been elected a deputy chairman of the Company from April 1. Two newcomers to the Board are Mr. A. E. Frost, ICI treasurer since 1960, who is appointed finance director, and Mr. S. D. Lyon, chairman of Agricultural Division. Both assumed their new responsibilities on March 1.

Following the new appointments, a reshuffle in the duties of executive directors and the new office of company planning director were announced on February 19. Mr. R. S. Wright takes on the latter post on April 1, in addition to his present duties as personnel director and liaison director for Agricultural Division.

Following the retirement of Mr. H. Smith, Mr. T. B. Clark has taken over as petrochemicals field director, HOC Division liaison director and territorial director for the Soviet Union, China and Eastern Europe.

From April 1 Mr. F. C. Bagnall becomes Pharmaceuticals Division liaison director in addition to commercial director and territorial director for Africa. Mr. Frost, the new finance director, also becomes territorial director for the Middle East, Pakistan and Afghanistan and Paints Division liaison director. Mr. S. D. Lyon, the other new director, is organisation and services director, building products field director, liaison director for Nobel Division and territorial director for Australasia, India and Pakistan and the Far East. Dr. J. E. Sisson, formerly organisation and services director, succeeds Mr. Clapham as overseas co-ordination director and remains territorial director for Latin America and Mond Division liaison director.

A classics graduate, Mr. Clapham began his career as a printer, joining ICI in 1938 to manage the Kynoch Press, part of the then Metals Division. He was appointed personnel director of the division in 1945, joint managing director in 1952, and chairman in 1960. He joined the ICI Board in 1961 and became overseas co-ordination director in 1965. Mr. Clapham, who is 56, played a leading part in the Duke of Edinburgh's First Conference on the Human Problems of Industrial Communities. He was also a member of the Albermarle Committee appointed to report on the Youth Service in England and Wales.

Mr. Frost, who is 53, becomes finance director of ICI in place of Mr. F. C. Bagnall. A barrister, Mr. Frost joined the taxation section of Treasurer's Department in 1949 from the Inland Revenue. He was appointed a deputy treasurer in 1957 and ICI treasurer in 1960. He has held several visiting directorships of ICI's manufacturing divisions and subsidiaries and is a director of Ilford Ltd. Mr. Frost has always been interested in music and athletics.

Mr. Lyon, chairman of Agricultural Division since 1966, is 50. He gained his B.Sc. in engineering at Edinburgh University and joined Dyestuffs Division in 1946 after six years' service with the Royal Engineers. In 1956 he became assistant chief engineer of that division and, in the following year, was made a member of the Wilton Council. Appointed production director of the then Billingham (now Agricultural) Division in 1962, he became deputy chairman in 1964 and chairman two years later.

New Division chairman

Succeeding Mr. Lyon as chairman of Agricultural Division is Mr. R. W. Pennock, a deputy chairman of the Division since 1964. Mr Pennock, who is 47 and comes from Tees-side, has spent a considerable part of his 20 years' Company service at Billingham. He joined ICI in 1947 from Oxford as a labour officer at Billingham, then went to Salt Division (now part of Mond Division), where he became Division staff and labour manager in 1952. He returned to Billingham in 1954 as Division staff manager, transferring to London three years later, first as an assistant head of the Central Staff Department, then as deputy regional manager of the Southern Sales Region. He went back to Billingham in 1961 as commercial director and was one of four deputy chairmen appointed when Agricultural Division was formed in 1964.

Mr. C. A. Pitts

Mr. J. L. Tedbury

Head Office appointments

Taking over as ICI treasurer is Mr. F. J. K. Hillebrandt, a deputy treasurer since 1966. Mr. Hillebrandt, who is 46, joined ICI in 1949 as a chartered accountant in Treasurer's Department. At various times he has served with the Paints and Heavy Organic Chemicals Divisions and from 1964 to 1966 was a director and chief accountant of Paints Division. He became an ICI deputy treasurer in 1966 and is a director of ICI (Europa) Ltd.

Two other key Millbank appointments are those of Mr. J. L. Tedbury, at present a deputy chairman of Mond Division, who succeeds Dr. H. G. Reid as general manager – commercial services when the latter retires on March 31, and Mr. C. A. Pitts, retiring chairman of the ICI group of companies in India, who takes over as general manager – overseas when Mr. E. Hodgkin retires, also at the end of March.

people in print

Philip Goodall

Philip Goodall, who writes about France's unique tidal power station in Brittany on page 46, is an electrical engineer. A graduate of Leeds University, he served with the Royal Navy from 1939 to 1946 and on demobilisation joined Dyestuffs Division at Manchester. He has been services engineer at the Division's Huddersfield Works since 1960. He is married with two sons – both engineers. Enjoys boating on the canals in summer, beagling in winter and 'coarse golf' on all suitable occasions.

Philip Hanscombe

Philip Hanscombe, who reports in this issue on his experience as a member of one of the first courses in Executive Development at the London Business School, is Decorative Products marketing manager and publicity manager for Paints Division. A graduate of Liverpool University, where he read economics, he worked for British Insulated Callendar's Cables, for Spillers Ltd. and in an advertising agency, where he worked on such accounts as Polycell products, Robbialac paints, Ercol furniture and Smirnoff vodka, before joining Paints Division in 1961 as a marketing executive in the Retail Marketing Department. He was made assistant marketing and publicity manager in 1963 and in September 1965 took over his present appointment. Since January this year he has also been responsible for market research.

Lawrence Hogben

Lawrence Hogben, as public relations manager of ICI (Europa) Ltd. in Brussels, meets every day the linguistic and other problems involved in the process of communication between European countries, in whose languages he claims to be 4½ up with 6½ to play. A former New Zealand Rhodes Scholar mathematician and officer in the Royal Navy, he joined ICI in 1948 after doing weather forecasts for industry and reading for his Ph.D. He worked first on agricultural promotion for Plant Protection and Agricultural Division and for a time headed a team investigating fertilizer distribution, then moved to Central Publicity Department in 1961 as head of the Company advertising section before joining ICI (Europa) in 1966. Commutes weekly between London and Brussels and elsewhere and probably puts in a higher mileage in Europe than anyone else in ICI.

Brian Young

Brian Young, who took the photographs of Southern Spain featured on pages 56–58, is a laboratory assistant at Agricultural Division's Jealott's Hill Research Station. He joined the Company from school in October 1965 and currently works in the Station's physical chemistry laboratories. Outside work he is a keen photographer and is a member of the Jealott's Hill photographic section. He also enjoys camping and climbing and has spent climbing holidays in Skye and Corsica.

For many years the Company has provided management training courses which have been continually changed to keep pace with changing needs. Today the emphasis is on improving the individual's performance in his work by on-the-job training at the initiative of his manager. In support, Divisions run formal courses at training centres to help people improve their knowledge and skills, while Company courses for managers are provided by Head Office departments at several centres.
The contribution made by sources outside the Company – universities and other companies – both by research and experience, must be taken into account. The type of course which the new business schools provide, described here by Philip Hanscombe, is one way in which managers can learn about the newest thinking relevant to their present and future jobs.

PHILIP HANSCOMBE

back to school on business

One Sunday evening about eighteen months ago, with Richard Pocock from Agricultural Division and 43 other men from a variety of organisations, I found myself at the London Business School. We were all members of one of the school's earliest Executive Development Programmes, and as we shifted uneasily from foot to foot over our pre-dinner drinks, making conversation with the staff and with one another, we wondered what the next twelve weeks held for us all. We had already been given some warning. A note included in the course instructions found in our rooms on arrival had said that *next morning* we should be prepared to speak authoritatively on the problems facing a well-known firm of machine-tool manufacturers. This seemed a sufficiently down-to-business introduction to one of Britain's first business schools. The London school, with another at Manchester, was founded as a result of the Robbins Report on higher education. Among other recommendations, this had said that more emphasis should be given to management training if Britain were to hold its own in world markets and that one way to do this would be to set up business schools.

The aims of our programme, in the words of a brochure sent to us in advance, were: (1) to develop skill in handling and analysing data so that more rational and informed decisions might be made; (2) to increase effectiveness in working with people through a greater understanding of organisational processes and human motivation, and by increasing personal skills in communication; (3) to develop a coherent concept of the management task.

These were the objectives, but it was left to Dr. Arthur Earle, Principal of the School, to let slip during his opening address later that evening that the programme had originally been designed to cover 20 weeks. It was recognised, however, that few companies would be prepared to release their managers for such a long time, so it had been decided that the course should last 12 weeks at the most – but with no reduction in the amount of work to be done. Here was an indication of the pressure which was to be put on everyone on the course.

To achieve the three objectives, the programme was in three parts. The first four weeks were spent on basic studies, including economic analysis, accountancy, human behaviour, and operational mathematics and statistics. This part of the course was the most demanding in many ways, for many of us had to acquire a great deal of basic knowledge, and quickly. Adjustment had also to be made from doing a day-to-day job to returning to an academic world which most of us had left at least 15 years before and in some cases much earlier. It was also basically designed to shock us into realising how little we knew and what vast areas of knowledge lay open to us. In this it was successful. By the end of the month, as we grasped at the opportunity for relaxation offered by our first long weekend (two whole days in which no work was called for), confidence was low – and intellectual activity high!

From learning these basic management tools we moved into the second phase. This covered a study of the environment in which we lived and operated, functional studies dealing with aspects of production, marketing and finance, and cross-function studies which involved industrial relations, personnel management, the role of the computer and operational research. The main thing we learned from this part of the course was how little many of us knew about those areas outside our immediate experience. Most people found the more conceptual matters such as marketing and industrial relations most difficult to grasp, especially the first. This I found disturbing in view of its significance today.

Most of the final three weeks was devoted to studies which brought together the skills and techniques covered earlier and to a large case study which put them all to use. Having shaken our complacency during the first four weeks, the rest of the course was spent in building up our confidence, based this time perhaps on surer foundations.

A mixture of teaching techniques was used, including lectures for the whole group and also syndicate sessions where we worked on specific problems individually and then in small groups. There were case studies on marketing, production and other subjects, and a formidable amount of reading which had to be done far into the night and at weekends. We also took part in a 'business game,' visited various organisations such as an advertising agency and a factory, and faced the rigours of a two-day programme of case studies organised by the Industrial Society.

In the business game, the purpose of which was 'to produce and sell a new dish-washing machine,' two separate groups worked in syndicates of five or six people, each of whom had a role to play in the fortunes of his own particular 'company.' In the first group, a team led by Richard Pocock scooped the pool by mass advertising a low-priced machine which produced dismay and confusion among their competitors and undoubtedly influenced the tactics used by the second group, which included my own syndicate. Against price-cutting and heavy advertising by our competitors, we took the opposite course by increasing the price and thus our profits, so that eventually we did equally well.

It soon became clear that the effectiveness of the course depended a great deal on the experience and ability of the individual member. Drawn as we were from a wide variety of industries and occupations (there were men from large and small industrial concerns, the Civil Service, nationalised industries, banking and insurance, and one schoolmaster), experts were usually available to add their own views to those of the staff and some fairly uninhibited exchanges took place. Obviously, different people learn different things from a course like this. Much will depend on their previous background and the extent to which their careers have involved the range of activities covered in the three months at the school. For myself, one of the useful things about this course was that it enabled me to look dispassionately and more objectively at what I was trying to achieve in my normal job. It also gave me an opportunity to measure how ICI compared with other leading British firms in such important areas as industrial and personnel relations and management techniques. This was particularly encouraging.

The programme was a highly-stimulating if occasionally nerve-racking experience – not for 20 years had I sat fervently hoping I would not be asked a question – but one I enjoyed. Like most learning processes, any changes occur imperceptibly even in such a limited period of time, and the individual who has been through it all is probably the worst judge as to what changes it has wrought. One's own colleagues are better able to assess the impact of such an experience.

Given the opportunity to attend, anyone with a rather narrow career background would be likely to benefit from this sort of course. It quickly helps him to understand a wide range of business activity and to see problems from points of view very different from those normally met in, say, a large company the size of ICI, but which may possibly be more relevant in the future than they have been in the past. It is a good corrective to the kind of in-breeding of ideas and attitudes which, again, can so easily occur when an individual has spent all or most of his business career in a very large organisation.

The ICI Personnel Committee, which is made up of Division personnel directors and senior members of Central Personnel Department, recently invited Dr Arthur Earle, Head of the London Graduate School of Business Studies – the 'London Business School' – to one of their meetings at Imperial Chemical House. Here Dr. Earle (directly in front of third panel to right of centre bookcase) talks to the Committee about the development of the School since 1966.

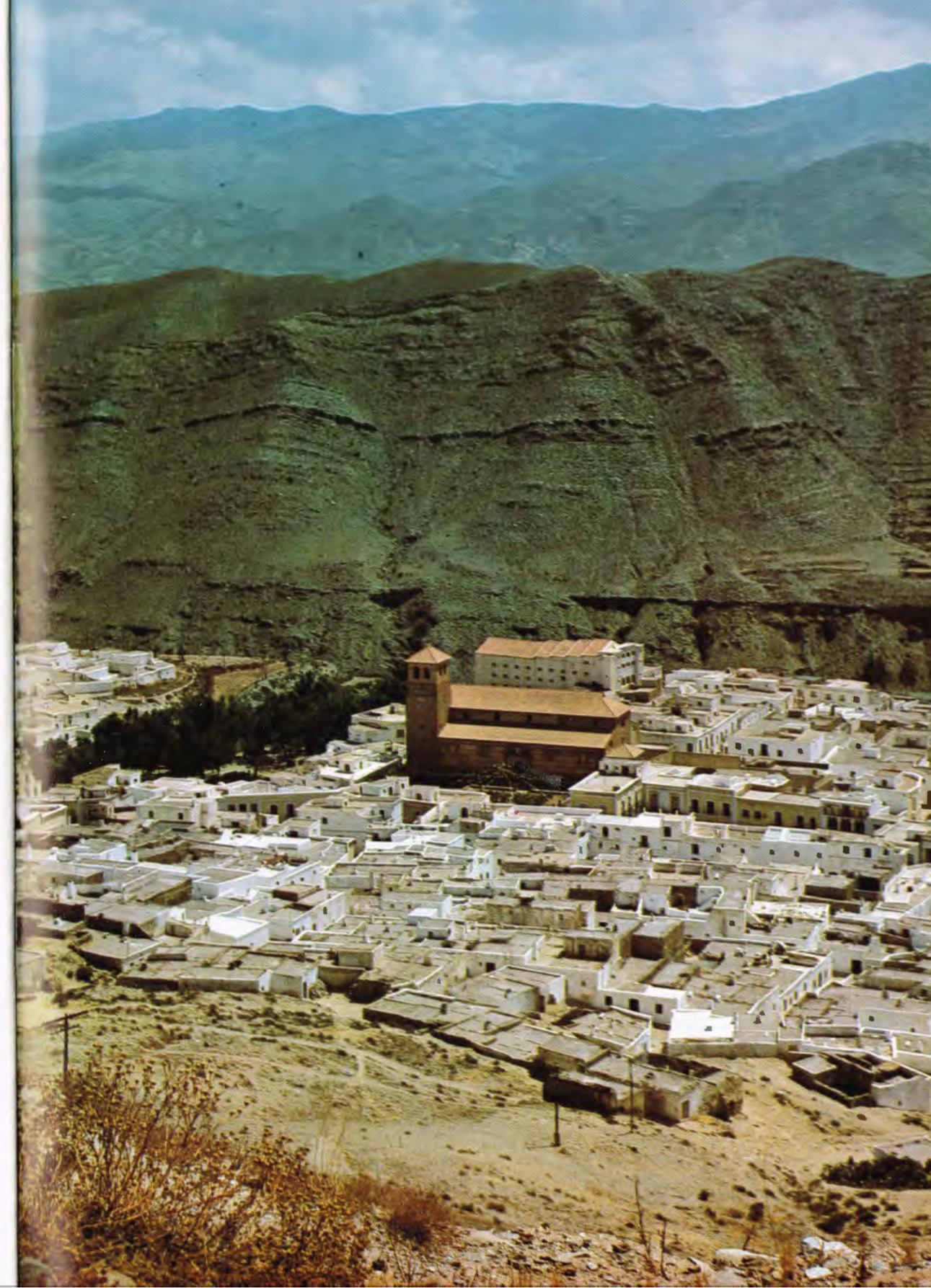
For nearly eight centuries the Moors ruled much of Spain. Sweeping up from North Africa in 711, they conquered most of the country within two years. By contrast, the Christian re-conquest was long-drawn-out and piecemeal, very different from the swift, triumphant campaign of the invaders. Cordoba, capital of the Spanish caliphate and at one time second in size only to Constantinople, was captured in 1085. Seville fell in 1248. But it was not until 1492 (the year Columbus sailed) that Boabdil, the last Muslim ruler, was driven out of his fairy-tale palace in Granada by the monarchs of Aragon and Castile, Ferdinand and Isabella.

Spain is a land of extremes. Nowhere is this truer than in the South. Snow-capped all winter and well into spring, the high sierras are then baked bare and brown by the summer sun. Below, in the rich fertile valleys and along the coast grow oranges, cotton and bananas. It was here, in settings so like North Africa, that the Moors established the main part of their kingdom.

Under a series of enlightened rulers, Spain enjoyed a golden age of wealth and splendour. Known throughout Europe and beyond for their love of learning and fine arts, they also encouraged craft industries like silk, metalwork, ceramics and leatherwork, still flourishing today. Agriculture prospered too: many of Andalusia's present-day crops, like sugar-cane, rice, apricots and almonds, were introduced by the

the splendour of Spain

Tabernas, once a Moorish stronghold, has the imposing ruins of an alcazabar (castle) high on a hill above the town. From these ruins you can see the old town far below, nestling between the barren ranges of the Sierra Alhamilla, north of Almeria. The patchwork of flat roofs shows the influence of Africa



Moors. The flat-roofed houses and the terraced hillsides of the South are also legacies of their rule, as are the narrow, tortuous streets of the old quarters of the cities. They were also great builders. As Cordoba, Seville, Granada and other towns grew in size and wealth, so the Moors built more of their palaces, mansions and mosques. Today the effect of these sometimes massive, often exquisite buildings is as breathtaking as ever.

Last summer Brian Young of Jealott's Hill Research Station was one of a small party, sponsored by the Fine Arts Department of the University of East Anglia, which visited Spain to study and photograph examples of Muslim architecture. Here are some of the pictures he took.

Cordoba, important even in Roman times, grew under the Moors to a splendour outshone only by Baghdad. Most famous building, the Great Mosque, now the cathedral, was begun in A.D. 785. Over 800 columns of marble, porphyry and jasper, linked by horseshoe arches, fill the main building. In the tenth century the vizier, Al Mansur, enlarged the mosque to twice its former size, making it the biggest sacred building of Islam after the Kaaba at Mecca

Granada, capital and stronghold of the last Moorish kingdom in Spain, fell to the Christians in 1492. The Palace of the Alhambra, the most remarkable example of Muslim art in Spain, dates chiefly from 1334 to 1391. The Court of the Lions was the centre of the harem, private residence of the Muslim rulers. The fountain in the centre rests on the backs of twelve lions carved in grey marble. An Arabic inscription round the rim of the basin praises God for the beauties of the Alhambra

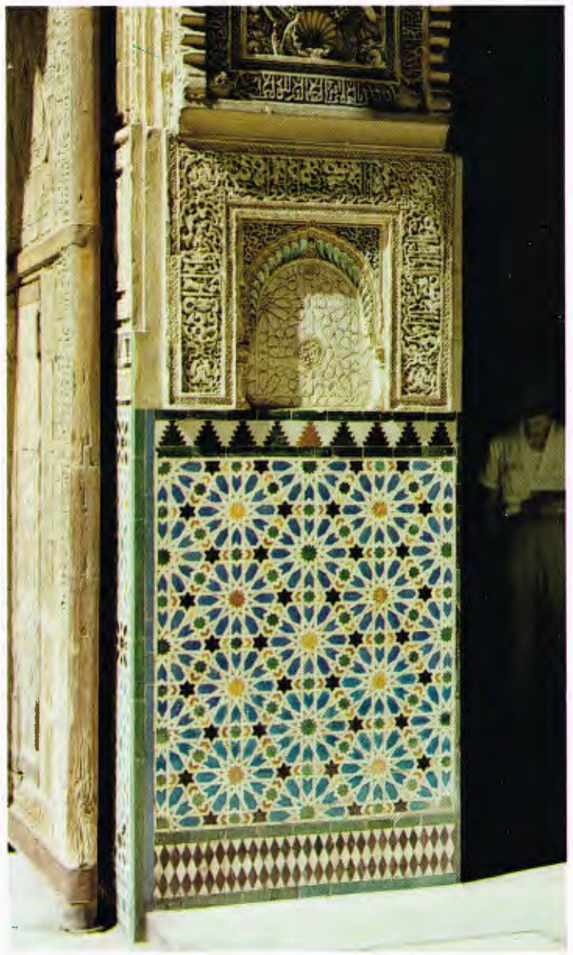
Consuegra, a small town founded by the Roman emperor Trajan, lies about 40 miles south-east of Toledo in the Mancha, the region made famous by Cervantes in *Don Quixote*. A long narrow ridge, crowned by the ruins of a castle, rises above the town. Framed by the castle walls is one of the characteristic windmills of the district

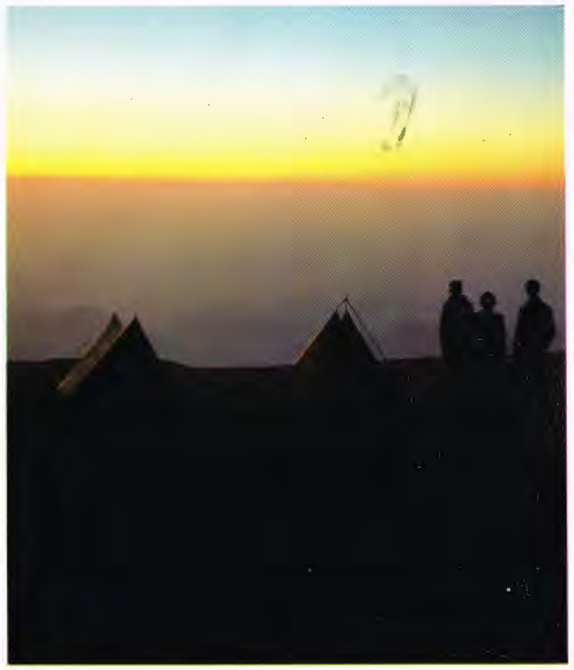
Toledo stands on a hilly promontory, surrounded on three sides by the River Tagus. The Puente de San Martin, one of two fortified Moorish bridges over the river, dates from 1212 but was rebuilt in the fourteenth century. In the background is the Friary of San Juan de los Reyes, founded in 1476 by the Catholic monarchs Isabella and Ferdinand. The outside walls of the church are hung with the chains of Christian prisoners freed from the Moors

Seville is the chief city of Andalusia and the fourth largest in Spain. Among its many historic buildings is the Alcazar, the palace first of the Moorish and then of the Christian kings. The beautiful state apartments were built for the Catholic monarch Pedro the Cruel by Moorish architects in the latter part of the fourteenth century. Shown here is the Maidens' Court

Pico de Veleta camp site at 10,000 ft., near the peak of that name, the second highest in the Sierra Nevada. Up here the air is thin and bitterly cold at night. So few campers stay for long – but from this spot, reached by the highest mountain road in Europe, there is an unforgettable view of Granada

Route Map





Drought and famine are a constant threat to millions in the Indian state of Bihar, who live off the land and therefore depend on the annual monsoon rainfall. After the failure of the rains in 1965 and again in 1966, Bihar last year faced its worst drought for decades. But for the supplies of food and medicine rushed in from other parts of India and from abroad, millions would have died. This report, from ICI (India), describes the part played by the ICI group of companies in India in the relief effort.

Bihar: fighting the famine

Bihar, one of the larger states of India, covers 67,000 square miles in area and is the home of over 50 million people. It lies centrally in the upper half of the Indian sub-continent and with parts of the neighbouring states of Uttar Pradesh and Madhya Pradesh comprises the country's drought belt, deprived as the region is of the coastal waters of peninsular India and the Himalayan wetness of the north. Most Biharis are farmers, living in small villages. Holdings are usually too small to be economic and farming methods are still backward. One failure of the annual monsoons means a major setback.

The rains had failed in 1965 and again in 1966, and by the autumn of that year Bihar faced the worst drought for decades. For the first time in a hundred years Bihar was officially declared an area under the Drought Code. By the time the call for help had gone out to other parts of India and to the outside world, famine was already severe in many districts.

The human suffering caused by famine has to be shared to be understood. Food, clothes and medicines had to be rushed to millions of villagers in inaccessible areas whose lives were at stake – and speed was vital. Supplies began coming in from all parts of the country and from abroad, a material expression of the concern felt by people everywhere at the plight of the Biharis. We in the ICI group of companies in India played our part in this.

Following a personal appeal from our chairman, Mr. C. A. Pitts, drought relief committees were quickly set up in every office and factory to organise collections, receive gifts and arrange for their despatch. The response from the 7,000 members of ICI in India was immediate and generous. Collection drives were organised through voluntary contributions and payroll deductions, through variety shows and raffles. Over Rs. 83,000 (£4610) was collected in cash in addition to food and clothing, and within two weeks of the chairman's appeal parcels of food, blankets, clothing, medicines and vitamins were on their way to the distribution headquarters of the Bihar Relief Committee.

ICI has a special stake in Bihar and in its prosperity. At Gomia in the Bihar coalfields, about 220 miles from Calcutta, is the site of Indian Explosives Limited's large factory and township, built in the heart of the scrub jungle by ICI in partnership with the Government of India and the Indian public. In eight years manufacture of industrial explosives has been developed to a point where the country is now

Three relief kitchens in the famine area were provided by employees of the ICI group of companies in India. Here Mr. Cyril Pitts, then the group chairman, discusses with Mr. S. P. Singh, of the Bihar Relief Committee, the running of the kitchen at Arwara. Paid for by employees at the Thana factory of Chemicals and Fibres of India and run by volunteers from Indian Explosives Ltd., it supplied 250 women, children and old people with a meal a day for five months

independent of imports. Since Gomia lay in the centre of the drought area, IEL felt it had a special part to play in the relief work. Having given Rs. 50,000 (£2780) to the Bihar Government's relief fund, the men of IEL went into the villages and fields to help the people.

Supporting the efforts of the Government and of agencies such as OXFAM, IEL volunteers organised and ran free food kitchens in three remote villages at Laheriadih, Neral and Arwara. These kitchens, financed by ICI units in Bombay, provided 800 people – women, children and old people – with a square meal a day, every day for five months. Other ICI men organised and ran kitchens and relief centres, for which money was provided by the Bengal Chamber of Commerce and Industry, in other distressed areas.

But it is not enough merely to feed the hungry and help the distressed. The real challenge was to give back, to people who had come close to losing it, the will to live and the means to make their living once again from the land that many had abandoned. It was perhaps in this area that ICI people in India made their most effective – and lasting – contribution.

Water was a basic need for survival, and sinking reliable wells seemed to be the answer, both short- and long-term. Simplicity, durability and ease of construction were the essentials, and IEL engineers produced a design which met all three. The ICI companies in India gave a sum of Rs. 100,000 (£5560) for fifty wells. And the chairman of Nobel Division, Dr. A. D. Lees, in Gomia at the time, made an on-the-spot contribution of £150 for an additional well.

The help of geologists was sought, but suitable sites were finally chosen with local village elders acting as water diviners. Primitive hand tools were used alongside blasting explosives and modern excavators for soil removal. And the men of IEL worked shoulder to shoulder with the villagers, digging, clearing and building the wells. At the height of the drought water was struck in some places at depths of only 15 feet.

After three months' hard effort 45 new wells had been constructed and seven old ones renovated. The wells, 35 feet deep and six feet in diameter, were lined with stone or brick to give a really solid finish and were provided with a simple superstructure and pulley. In addition to providing the much-needed water, sinking these wells also gave work to over 300 of the local villagers.

In July 1967 the rains came at last and in abundance. By October, with the first crops ready for harvesting, it was possible to say that the nightmare which millions of Biharis pray will never occur again was ended. But had it not been for the contributions freely given and for the voluntary work done by so many people, large numbers of them unconnected with Bihar, there is no doubt that millions would have died. The wells that dot the landscape are an enduring reminder of so much generous effort.

Opposite page: Two photographs taken near Gomia factory. On the right good vegetable crops contrast sharply with the barren, dried-up fields of the drought period at left

Below: ICI companies in India contributed Rs.100,000 (£5560) for 50 wells to be built in drought-stricken villages around Gomia factory in Bihar. IEL engineers designed the wells and supervised construction. Sinking the wells not only provided the much-needed water but also gave temporary work to more than 300 local villagers

ICI magazine

ICI's plants today are built on a scale undreamed of twenty years ago. These three ammonia units – part of Billingham's new £30 million ammonia complex – can produce over 900,000 tons a year. With older units, they increase annual capacity to 1½ million tons and make Agricultural Division the largest single ammonia producer in the world